

The hail-stones measured from one-quarter to one-half inch in diameter. The wind, which blew at the rate of twenty-eight miles per hour for five minutes, attained, during a gust, a velocity of forty miles per hour. Another storm from the west prevailed between 5.45 p. m. and 7 p. m.; maximum velocity of the wind, thirty-six miles per hour, at 6.05 p. m. Several cellars in the city were flooded by the heavy rain.

27-28th. New York.—Albany: one of the most severe gales of the season began at 6.54 p. m., 27th, and continued until 4.36 p. m. the following day; maximum velocity of wind, fifty-four miles per hour, at 2.10 a. m., 28th. Considerable damage was done to the outer breakwater by the wind and high sea; the inner breakwater was completely submerged. Trees, signs, etc., suffered from the gale. Navigation was entirely suspended during the early part of the 28th.

29-30th. Michigan.—Detroit: a heavy rain began 9.50 a. m., 29th, and continued steadily during the night and following day. A gale set in 7.18 a. m., 30th, and ended 8.51 p. m., same day; maximum velocity of the wind, thirty-two miles per hour from the northeast, at 3 p. m. The heavy rain caused considerable damage to buildings in course of erection, and several squares of the cedar paving was loosened and rendered useless. The traffic in the streets was seriously impeded and business generally suspended. Reports from all over the state show that the heavy rain during these days caused great damage to crops.

30th. Kansas.—Topeka: a storm began at 4.45 p. m. in the eastern part of Marion county, and travelled due east until within two miles of Clements, Chase Co., thence it passed

alternately southeast and northeast until it reached a high bluff about three miles from Clements, where it was dissipated. Time of passage forty-five minutes. The storm demolished several buildings, trees, and fences in its path. One man was killed and several seriously injured. **North Carolina.**—Charlotte: high wind began 11.30 a. m., and continued until 6.15 p. m., from the southeast and south; maximum velocity, thirty-four miles per hour from the southeast. Heavy rain began about noon and continued at intervals throughout the day, at times very heavy. Many fruit trees were blown down and other minor damage done in this city. A large tobacco warehouse was blown down at Danville, near this city; five persons were killed and several seriously wounded. Small grain, which was ready for harvesting, was considerably injured by the heavy rain and high wind. **Wisconsin.**—Milwaukee: a gale from the northeast began 8.15 a. m., 30th, and ended 2.15 a. m., 31st; maximum velocity of the wind forty-two miles from the northeast at 12.05 p. m., 30th. It is reported that the storm was very severe on Lake Michigan; a large number of vessels having sprung a leak, lost deck loads, and suffered other minor mishaps.

30th-31st. South Carolina.—Charleston: brisk to high southerly winds prevailed all day, 30th, and continued until the early part of the following day; maximum velocity of the wind thirty-six miles per hour from the south at 5.40 p. m., 30th. A similar velocity from the southeast was also recorded at 3.40 a. m., 31st. The steamer "Pilot Boy," and the pilot boat "Charleston," were blown ashore during the gale; they sustained but slight injury.

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS AND HARBORS.

The following table shows the danger-points at the various stations; the highest and lowest water for May, 1889, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, May, 1889 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River:</i>						
Shreveport, La.	29.9	1	17.9	29	10.9	7.0
<i>Arkansas River:</i>						
Fort Smith, Ark.	22.0	23	14.0	14	3.8	10.2
Little Rock, Ark.	23.0	26	15.4	16, 17	8.0	9.4
<i>Missouri River:</i>						
Fort Buford, Dak*		31	6.4	15	2.3	4.1
Omaha, Nebr.	18.0	1, 31	7.1	13, 14	6.4	0.7
Leavenworth, Kans.	20.0	28, 29, 30	9.2	5, 6	7.0	2.2
Kansas City, Mo.	21.0	29, 30	10.6	6	7.2	3.4
<i>Mississippi River:</i>						
Saint Paul, Minn.	14.5	21	4.5	15	3.2	1.3
La Crosse, Wis.	24.0	26, 27	6.6	1	4.6	2.0
Dubuque, Iowa	16.0	30	7.4	1	4.8	2.6
Davenport, Iowa	15.0	31	5.1	1, 2, 3, 4	3.2	1.9
Keokuk, Iowa	14.0	21, 22, 24	6.2	6, 7	3.0	3.2
Saint Louis, Mo.	32.0	31	24.1	9, 12	7.8	16.3
Cairo, Ill.	40.0	26	20.8	19	12.7	8.1
Memphis, Tenn.	34.0	1	16.3	21, 22	10.0	6.3
Vicksburg, Miss.	41.0	2	26.1	26	13.1	13.0
New Orleans, La.	13.0	5	9.1	25, 26, 28	4.3	4.8
<i>Ohio River:</i>						
Pittsburgh, Pa.	22.0	1	10.8	10	3.7	7.1
Parkersburg, W. Va.	38.0	2	14.0	22, 23	5.8	8.2
Cincinnati, Ohio	50.0	6	24.0	27	10.8	13.2
Louisville, Ky.	25.0	7	9.4	28	5.8	3.6
<i>Cumberland River:</i>						
Nashville, Tenn.	40.0	1, 2	6.8	25, 28, 29	3.4	3.4
<i>Tennessee River:</i>						
Chattanooga, Tenn.	33.0	7	5.0	26, 27, 28	2.7	2.3
<i>Monongahela River:</i>						
Pittsburgh, Pa.	29.0	1	10.8	10	3.7	7.1
<i>Savannah River:</i>						
Augusta, Ga.	32.0	31	9.8	30	6.8	3.0
<i>Willamette River:</i>						
Portland, Oregon ..	15.0	21	10.0	3, 4	5.2	4.8

* 13 days missing.

Mississippi River.—Vicksburg, Miss., 26th: this morning the stage of water in the river, 13.1 feet above low-water mark, is the lowest reading in May since the opening of the Signal Service Station in 1872.—*Report of Signal Service observer.*

Erie Canal.—Rochester, N. Y.: the canal was opened to navigation for the season on the 1st.

FLOODS.

A report, collated from all available data, of the disastrous floods of May 30th, 31st, and June 1st, in districts of the Middle Atlantic states and upper Ohio valley, is published in this issue of the REVIEW. The following reports refer to floods noted during the month in other sections of the country:

Kansas City, Mo.: at 3.30 a. m., 19th, two spans, each 120 feet long, of the National Waterworks Company's bridge, over the Kaw River, upon which the thirty-six-inch water main that supplies the city with water is supported, was washed away by the pressure of the high water and the jamming of driftwood. Damage estimated at \$20,000.

Chillicothe, Livingston Co., Mo., 21st: the Grand River, near this place, is greatly swollen, and the bottoms are flooded. Great damage and some loss of life is reported. All the ferry-boats have been washed away, and the bridges cannot be approached.—*Union Advertiser, Rochester, N. Y., May 21st.*

Littleton, Grafton Co., N. H., 22d: the heavy rains of the past two nights caused the upper reservoir of the Littleton Water and Electric Light Company to burst last night. The reservoir covered about eight acres, and the great body of water came down Palmer brook, gullying it into a large river bed, uprooting trees, and piling up debris. Two bridges and one barn were demolished, a dwelling seriously damaged, and the fields along the brook were flooded.—*Rochester, N. Y., Herald, May 23d.*

Albany, N. Y., 24th: the recent rains have caused the creeks along the Delaware and Hudson railroad to overflow and flood the lands from Smith's Basin, Washington Co., to Whitehall, same county. Considerable damage has been done to crops. Business on the Champlain canal has been suspended on account of the high water in the canal.—*New London, Conn., Telegraph, May 25.*

Topeka, Kans., 27th: the fields on the north side of Kansas River, between this place and Kansas City, are about one-third under water from the heavy rain in that section on the 23d. Houses and barns were observed standing on minia-

ture islands, wagon roads were under water, with nothing to indicate the roadway except the tops of fences on either side.

Chattanooga, Tenn.: rain began 2.37 a. m. and ended 9.35 a. m., 30th, falling at times very heavily; 2.55 inches fell in less than seven hours. The sewers were inadequate to carry

off the water, and the city was flooded in various places to a depth of from one to twenty-three inches.

HIGH TIDES.

Baltimore, Md.: considerable damage resulted from the high tide along the water front on the 31st. Many of the wharves were submerged by water during the day.

ATMOSPHERIC ELECTRICITY.

AURORAS.

On the Atlantic coast auroras were reported as far south as Egg Harbor City, N. J. West of the Atlantic coast auroras were not reported south of the fortieth parallel. The most notable displays occurred on the 21st, when they were observed in New Hampshire, Iowa, and Minnesota.

The following reports have been made of the more important displays noted:

Duluth, Minn.: an aurora was observed from 10.35 p. m. 21st to 1.20 a. m. 22d. It extended from about 160° to 200° azimuth, and to about 25° altitude. The display was very faint and consisted simply of a pale whitish light.

Saint Vincent, Minn.: an aurora consisting of a confused mass of light, which rose to altitude 12°, and extended from azimuth 145° to 220°, was observed from 11 p. m. 21st to 12.20 a. m. 22d.

Eastport, Me.: a faint auroral arch which rose to altitude 17°, and covered 90° of the horizon, from within a few degrees of east-northeast to northwest, was observed from 8.45 to 10.30 p. m. 26th.

Auroras were observed during the month as follows: 3d, Peking, Ill.; Cresco, Iowa. 5th, West Milan, N. H. 10th, Royalston, Mass. 13th, Grantsburgh, Wis. 18th, South Canisteo, N. Y. 21st, Dysart, Iowa; Duluth and Saint Vincent, Minn.; Nashua, N. H. 23d, South Canisteo, N. Y. 25th, Tatoosh Island, Wash. 26th, Eastport and Mayfield, Me.; Royalston, Mass. 27th, South Canisteo, N. Y. 28th, Bev-

erly, N. J. 30th, Egg Harbor City, N. J.; South Canisteo, N. Y. 31st, Dysart, Iowa.

THUNDER-STORMS.

The more severe thunder-storms are described under "Local storms." Thunder-storms were reported in the greatest number of states and territories, twenty-seven, on the 13th; in twenty-six on the 10th and 29th; in twenty-four on the 14th, 20th, and 27th; in twenty-two on the 21st, 25th, and 30th; in twenty-one on the 26th; in from fifteen to twenty, inclusive, on the 11th, 12th, 17th to 20th, 22d to 24th, and 28th; in from ten to fourteen, inclusive, on the 1st, 7th, 9th, 15th, 16th, and 31st; in from five to nine, inclusive, on the 2d to 6th, and 8th. There were no dates for which thunder-storms were not reported in one or more states or territories.

Thunder-storms were reported on the greatest number of dates, twenty-nine, in Kansas; on twenty-one in Illinois; on twenty in Iowa and Michigan; on from fifteen to nineteen, inclusive, in Minnesota, Missouri, North Carolina, Ohio, Pennsylvania, and Texas; on from ten to fourteen, inclusive, in Alabama, California, Dakota, District of Columbia, Indiana, Indian Ter., Louisiana, Maryland, Massachusetts, Nebraska, New York, South Carolina, Tennessee, Virginia, and Wisconsin; on from five to nine, inclusive, in Arkansas, Colorado, Florida, Georgia, Kentucky, Mississippi, Montana, Nevada, New Jersey, Oregon, Washington, West Virginia, and Vermont. There were no states or territories in which thunder-storms were not reported for one or more dates.

MISCELLANEOUS PHENOMENA.

PRAIRIE FIRES.

Prairie fires were reported during the month as follows: New England City, Dak., and Saint Vincent, Minn., 3d; Saint Cloud, Minn., 7th; Fort Sill, Ind. T., 11th.

FOREST FIRES.

Duluth, Minn., 7th: destructive forest fires are still raging in all directions, but in many localities they have burned themselves out. They have attacked the heavy pine woods in many places, and the loss of timber will be very large. Several hundred thousand ties, and thousands of cords of wood have been burned. Numerous buildings, hay, meadows, crops, and bridges have been burned in the western part of the county. Farmers and mill men in the country are fighting the fires. The air in the city is filled with smoke.—*Chicago, Ill., Tribune, May 7.*

La Crosse, Wis.: extensive forest fires prevailed in the northern part of the state on the 4th, 5th, and 6th, and owing to the dry weather the fires burned fiercely. Railroad men arriving over the Omaha road on the 4th report that the forest from Ashland to Clear Lake, one hundred and fifty miles, is ablaze. Many thousands of ties have been destroyed and some towns endangered. On the Fond du Lac Indian reservation \$50,000 worth of logs and skids were burned. The heavy rain which fell on the 7th in the northern section of the state, partially extinguished the fires.

Mason City, Cerro Gordo Co., Iowa, 8th: destructive fires have been burning in the woods between Plymouth and Rock Falls, this county, since the evening of the 4th. So far the

farmers have been able to save their homes.—*Union and Advertiser, Rochester, N. Y., May 8.*

Newburgh, Orange Co., N. Y., 8th: forest fires are burning in the Shallangunk Mountains and in the Catskills; also in the highlands below this city, and on the Fishkill Mountains. Passengers on the New York and New England road state that the fires are burning on the mountains in that vicinity and on the state line. A large amount of wood land has been seriously damaged. The fires are reported to be on the increase in all directions.—*Democrat and Chronicle, Rochester, N. Y., May 9.*

Michigan: reports from various points in the upper peninsula show that severe forest fires have been in progress in that section since about the 5th; fences, cord wood, shingles, posts, and standing timber have been consumed. It is estimated that half a million feet of logs have been burned, the crops ruined in many localities, and a large number of buildings destroyed. Reports also show that destructive fires were general at about the same time in the northern portion of the state, and in Ottawa, Muskegon, Midland, Clare, Gladwin, and Osceola counties, in the middle portion; in Lenawee county, in the southeastern, and Allegan county in the southwestern portion of the state. The light rain in the upper peninsula on the 8th, and in the southern half of the state on the 10th, and the general rain throughout the state from the 15th to the 22d extinguished the fires.

Custer City, McKean Co., Pa., 8th: a fierce forest fire has been raging about the Moody tract, five miles south of this place, all day. The tract is one of the most valuable oil properties in this county, and a large number of rigs and small